

REMARKS

I. Introduction

By the present Amendment, claims 1, 7, 8, 10, 12, and 17 have been amended. No claims have been added or cancelled. Accordingly, claims 1-3, and 5-20 remain pending in the application. Claims 1 and 17 are independent.

II. Office Action Summary

In the Office Action of December 31, 2007, claims 7, 8, 10, and 12 were objected to because of various informalities. Claims 1-20 were rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,044,913 issued to Shiki et al. ("Shiki") in view of U.S. Patent No. 6,116,244 issued to Hossack et al. ("Hossack"). This rejection is respectfully traversed.

III. Claim Objections

Claims 7, 8, 10, and 12 were objected to because of various informalities. Regarding this objection, the Office Action indicates that these claims recite the term "the variance" which lacks proper antecedent basis.

By the present Amendment, Applicants have amended claims 7, 8, 10, and 12 to recite --a variance-- which corrects the lack of antecedent basis. Withdrawal of this objection is therefore respectfully requested.

IV. Rejections under 35 USC §103

Claims 1-20 were rejected under 35 USC §103(a) as being unpatentable over Shiki in view of Hossack. Regarding claim 1, for example, the Office Action alleges that Shiki discloses an ultrasound apparatus for forming a tomogram of an examinee by transmitting/receiving an ultrasound wave via an ultrasound probe. The Office

Action indicates that Shiki discloses a color Doppler image forming means, image processing means for both the tomogram and the Doppler image, and a display to display the images. The Office Action admits that Shiki fails to disclose a degree of transparency of the color Doppler image. Hossack is relied upon for disclosing control of the degree of the transparency of the color Doppler image based on blood flow information or variance of the blood flow. The Office Action concludes that it would have been obvious to combine the teachings of Shiki and Hossack to arrive at the claimed invention. Applicants respectfully disagree.

As currently, amended, independent claim 1 defines an ultrasound diagnostic apparatus that comprises:

- a tomogram forming means for forming a tomogram of a diagnosis portion of an examinee by transmitting/receiving an ultrasound wave to/from the examinee via an ultrasound probe;

- color Doppler image forming means for forming a color Doppler image based on a Doppler signal obtained from the diagnosis portion;

- image processing means for performing image processing on the tomogram and the color Doppler image;

- display means for displaying images obtained by the image processing means, the tomogram and the color Doppler image being color displayed on the display means,

- wherein the image processing means causes the color Doppler image to be displayed transparently;

- characterized in further comprising:

- a transparency control means for controlling a degree of the transparency of the color Doppler image of the transparent display; and

- selection means for selecting one or both of a luminance/hue color bar and/or a transparency color bar for alternatively or simultaneously displaying the luminance/hue color bar and/or the transparent color bar on the display means.

The ultrasound diagnostic apparatus of independent claim 1 includes a tomogram forming means, Doppler image forming means, image processing means,

display means, a transparency control means, and selection means. The tomogram forming means forms a tomogram of a diagnosis portion of an examinee by transmitting/receiving ultrasound waves to/from the examinee using an ultrasound probe. The color Doppler image forming means forms a color Doppler image based on a Doppler signal obtained from the diagnosis section. The tomogram and color Doppler image are subject to image processing by the image processing means. The images obtained by the image processing means, the tomogram, and the color Doppler image are displayed in color on the display means. The image processing means also causes the color Doppler image to be displayed transparently. The transparency control means controls the degree of transparency of the color Doppler image of the transparent display. Furthermore, according to independent claim 1, the selection means selects either or both of the luminance/hue color bar and/or a transparency color bar for alternate or simultaneous display of the luminance/hue color bar and/or the transparent color bar on the display means.

According to independent claim 1, it is possible for an operator to easily recognize whether blood flow is fast or slow, and whether the variance of the blood flow is high or low by simply referencing the luminance/hue color bar. The operator can also recognize whether the blood flow part is set to be transparent or not by referencing the transparency color bar. Furthermore, the operator can select a preferred color bar based on the type of scan being examined. For example, if the operator selects both, then it can be understood that the luminance/hue color in the low transparent part properly corresponds to the blood flow velocity. Also, the luminance/hue color in a high transparent part would not correspond to the blood flow velocity because the blood flow information at different points on a line of sight

would be cumulatively summed so that the correspondence between the luminance/hue color and the blood flow velocity is lowered in the outcome.

The Office Action alleges that Shiki discloses most of the features recited in independent claim 1. The Office Action further admits that Shiki fails to disclose the transparency control means for controlling the degree of transparency of the color Doppler image. Reliance is placed on Hossack for disclosing this feature. Applicants' review of Hossack, however, has failed to reveal any disclosure or suggestion for the newly added features of independent claim 1. Hossack discloses a method and system for generating three-dimensional representations using opacity modulation. The opacity levels are controlled as a function of a Doppler parameter. Thus, some of the data is rendered more opaque than others. Based on this difference in opacity, it is possible to emphasize areas of clinical interest, such as a leak in a heart valve or other areas associated with high variance or velocity jets, on the display. Hossack appears to be completely silent on providing an ability to select a luminance/hue color bar and/or transparent color bar either simultaneously or independently on the display means. More particularly, Hossack fails to disclose features recited in independent claim 1, such as:

selection means for selecting one or both of a luminance/hue color bar and/or a transparency color bar for alternatively or simultaneously displaying the luminance/hue color bar and/or the transparent color bar on the display means.

It is therefore respectfully submitted that independent claim 1 is allowable over the art of record.

Claims 2, 3, and 5-16, 19, and 20 depend, either or indirectly, from independent claim 1, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 1. In addition, these claims each

introduce novel elements that independently render them patentable over the art of record.

As currently amended, independent claim 17 defines an ultrasound diagnosing method that comprises the steps:

- a transmitting/receiving step for transmitting/receiving an ultrasound wave to/from an examinee via an ultrasound probe;

- a forming step for forming a tomogram of a diagnosis portion of the examinee;

- an imaging step for forming a color Doppler image based on a Doppler signal obtained from the diagnosis portion;

- an image processing step for performing image processing on the tomogram and the color Doppler image;

- a first display step for displaying the images which underwent the image processing so as to display the tomogram and the color Doppler image in color display;

- a second display step for displaying the color Doppler image transparently which includes a control step for controlling a degree of the transparency of the color Doppler image of the transparent display; and

- a step of selecting one or both of a luminance/hue color bar and/or a transparency color bar for alternatively or simultaneously displaying the luminance/hue color bar and/or the transparent color bar on the display means.

The ultrasound diagnosis method of independent claim 17 recites various steps that are somewhat similar to those recited in independent claim 1. For example, the method includes a step of selecting one or both of a luminance/hue color bar and/or a transparency bar such that the luminance/hue color bar and the transparent color bar can be displayed either simultaneously or alternatively on a display means. As previously discussed with respect to independent claim 1, the art of record fails to provide any disclose or suggestion for such features.

It is therefore respectfully submitted that independent claim 17 is allowable over the art of record.

Claim 18 depends from independent claim 17, and is therefore believed allowable for at least the reasons set forth above with respect to independent claim 17. In addition, this claim introduces novel elements that independently render it patentable over the art of record.

V. Conclusion


For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 529.45793X00).

Respectfully submitted,
ANTONELLI, TERRY, STOUT & KRAUS, LLP.

/Leonid D. Thenor/ 
Leonid D. Thenor
Registration No. 39,397

LDT/vvr
1300 N. Seventeenth Street
Suite 1800
Arlington, Virginia 22209
Tel: 703-312-6600
Fax: 703-312-6666

Dated: March 31, 2008